

Molarity Practice: Pre-AP

Use your knowledge of the concentration [Molarity] to solve the following problems. **You will need to complete it on a separate sheet of paper. Show all work including units or no credit may be given.**

Fill out the missing data in the table below by using the given information:

Compound	Molar Mass (g/mol)	Mass of Solute (g)	Moles of Solute	Volume of Solution (L)	Molarity (mol/L)
HCl	36.5	26.0		0.600	
H ₃ PO ₄	60.0	100		1.2	
CaO	56.0	48.0		0.25	
CuNH ₄ (NO ₃) ₃		125			0.375
KMnO ₄			1.2		2.6
K ₂ Cr ₂ O ₇	294	375		0.8	
KOH			0.45		0.82

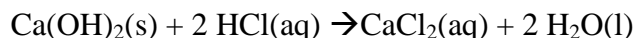
Complete each of the problems below

- Sea water contains roughly 28.0g of NaCl per liter. What is the molarity of sodium chloride in sea water?
- What weight (in grams) of H₂SO₄ would be needed to make 750.0 mL of 2.00 M solution?
- What volume (in mL) of 12.0 M HCl is needed to contain 3.00 moles of HCl?
- Determine the mass (g) of solute to prepare these solutions:
 - 0.289L of a 0.00300 M Cu(NO₃)₂ solution.
 - 16.00 mL of a 5.90M Pb(NO₃)₂ solution.
 - 508 mL of a 2.75 M NaF solution.
 - 6.20 L of a 3.76-molar Na₂O solution.
- Determine the final volume (L) of these solutions:
 - 4.67 moles of Li₂SO₃ dissolved to make a 3.89 M solution.
 - 4.907 moles of Al₂O₃ to make a 0.500 M solution.
 - 0.783g of Na₂CO₃ to make a 0.348 M solution.
 - 8.97g of (NH₄)₂CO₃ to make a 0.250-molar solution.
- Problem 7-15 are stiochiometry based; remember that you need moles and volume to get molarity.
- If 5.0g of sodium is added to water and the resulting solution of sodium hydroxide has a volume of 0.1L what is the molarity of the Sodium hydroxide solution?
$$\underline{2}\text{Na(s)} + \underline{2}\text{H}_2\text{O(l)} \rightarrow \underline{1}\text{H}_2\text{(g)} + \underline{2}\text{NaOH(aq)}$$

8. $\text{Mg(OH)}_2(\text{s}) + 2 \text{HBr}(\text{aq}) \rightarrow \text{MgBr}_2(\text{aq}) + 2 \text{H}_2\text{O}(\text{l})$
a) How many milliliters of 0.225 M HBr would be needed to react completely with 3.26 grams of magnesium hydroxide?

b) If 31.6 grams of magnesium hydroxide is combined with 68.0 mL of 0.725 M HBr, which is the limiting reagent? How many grams of magnesium bromide would be formed?

9. How many litres of 0.100 M HCl would be required to react completely with 5.00 grams of calcium hydroxide?



10. Your teacher asks you to prepare 500 mL of a 2.75 molar solution of NaCl for an upcoming laboratory experiment. Write a step-by-step procedure describing how you would carry out this task.

Molality Practice

Use your knowledge of the molality to solve the following problems. **You will need to complete it on a separate sheet of paper. Show all work including units or no credit may be given.**

$$m = \frac{\text{mol}_{\text{solute}}}{\text{kg}_{\text{solvent}}}$$

11. What is the difference between solute and solvent?

12. How does molality (*m*) differ from molarity (M)?

13. 45.7 g of magnesium chloride is dissolved in 2.40 kg of water.

a) Write the correct formula for magnesium chloride.

b) What is the **molality (*m*)** of the solution?

14. Calculate the molality of each of the following solutions:

a. 3.50 g of H_2SO_4 in 12.0 g of water

b. 170.0 g of ethyl alcohol ($\text{C}_2\text{H}_6\text{O}$) in 650.0 g of water

c. 2.60 g of glucose ($\text{C}_6\text{H}_{12}\text{O}_6$) in 110.0 g of water

15. Calculate the number of grams of solute necessary to prepare the following aqueous solutions:

a. 400.0 g of a 0.400 m solution of ethyl alcohol

b. 700.0 g of 0.500 m solution of sulfuric acid (H_2SO_4)

c. 425 g of a 3.30 m solution of ethylene glycol

16. Calculate the number of grams of water that must be added to

a. 65.0 g of glucose in the preparation of a 2.00 m solution

b. 95.0 g of sugar in the preparation of an 8.00 m solution

c. 4.10 mol of sulfuric acid in the preparation of a 12.0 m solution.

Key

Compound	Molar Mass (g/mol)	Mass of Solute (g)	Moles of Solute	Volume of Solution (L)	Molarity (mol/L)
HCl	36.5	26.0	0.71	0.600	1.187
H ₃ PO ₄	60.0	100.	1.67	1.2	1.4
CaO	56.0	48.0	0.857	0.25	3.43
CuNH ₄ (NO ₃) ₃	268	125	0.466	1.24	0.375
KMnO ₄	158	189.6	1.2	0.46	2.6
K ₂ Cr ₂ O ₇	294	375	1.28	0.8	1.59
KOH	56	25.6	0.45	0.549	0.82

1. 0.483M

2. 147g

3. 250mL

4. a) 0.163g
b) 32.62g
c) 58.7g
d) 1445g

6. a) 1.2L
b) 9.8L
c) 0.021
d) 0.374

7. 2.17M

8. a) 499ml b) HBr, 4.5

9. 1.35L

10.

11. what is in denominator, molarity is temperature dependent

12.

13. a) MgCl₂ b) 2.02m

14. a. 2.98m H₂SO₄ b. 5.69m ethyl alcohol c. 0.13m

15. a. 7.36g ethyl alcohol b. 34.3g H₂SO₄ c. 87.0g ethylene glycol

16. a. 181g b. 66g c. 342g.